

Claims

1. A pipe for pressurised-fluid feed systems, in particular for feeding fuel in diesel engines or the like, comprising a wall of predetermined thickness with an internal surface (1) and an external surface (2) and an internal bore with a predetermined diameter for through-flow of the fluid, characterized in that the internal surface and/or external surface are treated by means of nitriding and/or carbonitriding so as to obtain an increase in the hardness and/or mechanical strength of the pipe, with regard to both radial and tangential stresses and axial stresses.

2. A pipe according to claim 1, wherein said pipe is made from metals, steels, alloyed steels produced by nitriding and/or multiple-wall pipes with a stronger internal core.

3. A pipe according to claims 1 and 2, wherein the dimension of the thickness of the wall is much greater than the dimension of the bore diameter, i.e. the pipe has an external diameter much greater than the internal diameter.

4. A pipe according to claim 1, wherein the internal diameter of the pipe, namely the diameter of the bore, is very small and in particular in the region of between one and three millimetres.

5. A pipe according to claim 1, wherein at least the external surface is subjected to a nitriding or carbonitriding treatment.

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6. A pipe according to claim 1, wherein at least the internal surface is subjected to a nitriding or carbonitriding treatment.

Sub. A3

7. A pipe according to claim 1, wherein both the surfaces, i.e. internal surface and external surface, are subjected to a nitriding or carbonitriding treatment.

8. A pipe according to claim 1, wherein the nitriding or carbonitriding treatment envisages cycles for increasing or lowering in a pulsed manner the pressure of the controlled nitrogen or carbon and nitrogen atmosphere.

9. A pipe according to claim 1, wherein in combination with the nitriding or carbonitriding treatment, the step of subjecting the said pipe to a prestressing process, in particular the process called "autofrettage", is envisaged.

10. A pipe according to claim 1, wherein at least one front end shaped for sealed connection and in that the nitriding or carbonitriding treatment is also extended to at least part of the internal surface and/or external surface of the front ends of the pipe.

Sub. A4

11. A pipe according to claim 1, wherein said pipe forms a tubular element or a part of a pressurised-fluid feed system having a number of functions greater than that of merely conveying fluid, such as, for example, a manifold element or the like, in particular a manifold used in so-called "common rail" feed systems for diesel engines.

12. A pipe according to claim 1, wherein said pipe has one or more external and/or internal lining layers which are subjected either at least together or separately to a single-face or dual-face strengthening treatment by means of nitriding and/or carbonitriding.

13. A method of manufacturing a pipe or a tubular element, characterized by the steps of

drawing of the pipe;

all the machining operations, from cutting in the unfolded condition to shaping of the individual pipes; and

the carrying out of an internal and/or external surface treatment so as to obtain an increase in the hardness and/or mechanical strength of the pipe, with regard to both radial/tangential stresses and axial stresses.

14. A method according to claim 13, wherein at least the internal surface of the pipe is subjected to a nitriding or carbonitriding treatment.

15. A method according to claim 13, wherein at least the external surface of the pipe is subjected to a nitriding or carbonitriding treatment.

16. A method according to claim 13, wherein both the surfaces, i.e. internal surface and external surface, of the pipe are subjected to a nitriding or carbonitriding treatment.

17. A method according to claim 13, wherein the nitriding or carbonitriding treatment is also extended to at least part of the internal

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B1 and/or external surfaces of the front ends of the pipe by means of screening of the parts not to be treated.

5 18. A method according to claim 13, wherein the nitriding or carbonitriding step envisages cycles for increasing or lowering in a pulsed manner the pressure of the controlled nitrogen or carbon and nitrogen atmosphere.

10 *Sub B1* 19. A method according to claim 13, wherein in combination with at least one preceding and/or with at least one subsequent step, an additional step consisting of subjecting the pipe to a prestressing process.

15 *Sub A5* 20. A method according to claim 13, applied to a pipe which forms a tubular element or a system part having a number of functions greater than that of merely conveying fluid, such as, for example, a manifold element or the like, in particular a manifold for so-called "common rail" feed systems for diesel engines, is envisaged.

20 *Sub B1* 21. A method according to claim 13, comprising one or more steps for internally and/or externally lining the pipe prior to or after surface treatment thereof and/or one or more steps for separate or simultaneous surface treatment of the internal and/or external lining layer(s) of the pipe.

25 22. A method according to claim 13, comprising a surface oxidation step intended to provide an attractive aesthetic appearance and high corrosion resistance.

Add A6

Add B1

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